undoubted deep-sea species is *Pontostratiotes abyssicola*, dredged in 2200 fathoms. This was previously described in MS. by Dr. von Willemoes Suhm as *Lernæa abyssicola* and was found on *Ceratias uranoscopus* dredged in 2400 fathoms.

Tunicates.—M. L. Roule has studied the genus Rhopalea, an ascidian abundant near Marseilles at a depth of fifty to sixty meters. Rhopalea does not reproduce by budding, and may be considered as forming a link between the simple and the compound tunicates.

Batrachians.—M. G. Calmels finds in the poison of batrachians a small portion of methylcarbylamine, which gives to the liquid some of its odor and toxic qualities; it also contains, in larger quantities, an acid from which the methylcarbylamine is formed.

Birds.—Herr Stieneger informs *Naturen* that Kamtschatka has four species of sea-eagle, *Haliaëtus hypoleucus*, *H. albicilla*, *H. leucocephalus*, and *Thalassaëtus pelagicus*. The first of these is distinguished from the others by the dazzling whiteness of some parts of the body and by its generally lighter color. Among the cetacean crania collected, three seem to belong to a new species.

Mammals.—Dr. P. Albrecht, in a communication to the Anthropological Society of Brussels, maintains that there are primitively four intermaxillaries, and that hare-lip, which is never central, takes place by the separation of the inner and outer intermaxillaries of one or the other side. As proof of this, he figures cases of double hare-lip, in which the two inner bones (endognathia) stand out as a separate bone anchylosed in the median line, while each outer intermaxillary, bearing its incisor, is united to the maxillary. In the Ornithorhynchus, as figured in a communication of the same observer to the Pathological Society of Brussels, the two outer intermaxillaries (mesognathia) are large and widely separated, while between them, but further back, is a single bone, which is by M. Albrecht homologized with the endognathia. On each side of this is an incisive canal. Behind the mesognathia are two large submaxillaries or exognathia.

PHYSIOLOGY.[1]

CONNECTION BETWEEN PHYSIOLOGICAL ACTION AND CHEMICAL CONSTITUTION OF DRUGS.—Dr. Blake states very confidently that a physiological classification may be made of chemical substances according to their isomorphism and atomic weights. Isomorphous substances, regardless of chemical composition, have the same general physiological action. He found, moreover, "that amongst the salts of the metallic elements the intensity of their physiological action was connected with the atomic weight of the element, so that when the elements are arranged in isomorphous

[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.

groups, the action of substances in the same isomorphous group is a function of the atomic weight, the greater the atomic weight the smaller the quantity required to produce the same physiological action." The author divides the chemical elements into ten groups, in each of which, among the metals, with one exception, the salts are isomorphous and have characteristic physiological actions which are described in detail.—*Jl. of Physiology, Vol.* v, *No. 1.*

THE ACCELERATOR AND INHIBITORY NERVES OF THE HEART OF COLD-BLOODED ANIMALS.—The heart of the frog is connected with the central nervous system only through branches of the vagus nerves, while in the higher animals the heart is separately supplied by the vagus and fibers from the ganglia of the sympathetic system. When the sympathetic branches are cut and their peripheral or heart ends are stimulated, the rate of heart-beat is quickened. But the reverse effect follows when either vagus nerve is treated in the same way; the heart-beat in this case being retarded or stopped. It is accordingly believed that the sympathetic heart-nerves are efferent accelerator nerves, while the fibers of the vagus have a cardio-inhibitory function. But in the case of the frog Gaskell finds that stimulation of the vagus, which is the only heart-nerve, may: "1. Slow or accelerate the rate of the beat; 2. Diminish or augment the force of the contractions both of auricle and ventricle; 3. Lessen or increase the excitability of the cardiac muscle; 4. Diminish or improve the conduction power of the muscular tissue. Such opposing effects are evidently due to one of two causes, either (1) to the joint stimulation of nerves belonging to two separate nerve systems of which the one system contains purely inhibitory and the other purely augmentor (accelerator) fibers; or else (2) to the stimulation of nerves which are able sometimes to augment, sometimes to inhibit the cardiac functions according to varying conditions of the nerves or of the heart itself. In order to decide between these two hypotheses, it seemed to me advisable to find a cold-blooded animal possessing definite accelerator nerves, so as to see whether the sympathetic system provided the heart entirely with augmentor fibers while the vagus contained only inhibitory. For this purpose I selected the crocodile as being the most likely of all cold-blooded animals to possess a nervous system closely resembling that of the warm-blooded. My expectations were fully answered; the accelerator nerves of the crocodile leave the main sympathetic chain at a large ganglion corresponding apparently to the ganglion stellatum of warm-blooded animals, and accompany the vertebral artery up to the superior vena cava, where they leave the artery and passing alongside the vein anastomose with branches of the vagus in the neighborhood of the heart. Stimulation of these nerves increases the rate of the car-

diac rhythm and augments the force of the auricular contractions, while stimulation of the vagus slows the rhythm and diminishes the strength of the auricular contractions."

Guided by these facts the author was successfully led to attempt to isolate the sympathetic nerve twigs which join the cranial vagus in the frog near its exit from the skull, and the following are the physiological results obtained :

"Stimulation of the sympathetic before its entrance into the combined ganglion of the sympathetic and vagus, produces purely augmentor (accelerator) effects. Stimulation of the vagus within the cranial cavity before its entrance into the ganglion, produces purely inhibitory effects."

The communication is of special value in removing a doubt as to whether the action of individual nerves is physiologically invariable or capable of being altered under changed conditions. —*Jl. Physiology, Vol.* v, *No. 1.*

THE TIME TAKEN BY THE BLOOD IN MAKING THE CIRCUIT OF THE BODY.—Dr. Smith, in describing a new method for determining the velocity of the blood current, calls attention to the inaccuracy of the old experiments by which it was sought to find the rate of circulation by measuring the time elapsing between the injection of an iron salt into one jugular vein and its appearance in the jugular on the other side of the neck. Various chemical substances in solution make this circuit in very different periods, because, apparently, of their different diffusibility. According to the method now considered, de-fibrinated pigeon's blood is injected into one jugular vein of an animal whose blood is allowed to drop from the other jugular into a series of watch-glasses placed in a circle upon a table which is revolved by clock-work. Microscopic examination of the blood thus collected is made to determine in which watch-glass the oval corpuscles of the pigeon's blood first appear; then knowing the rate at which the table is turned it is easy to estimate the time taken by the pigeon's blood in passing from one jugular to the other, in which passage it has probably traversed not only the heart and lungs, but the capillaries of the head as well. The mean of six experiments gives the time of circulation in the dog as 17.5 seconds, during which the heart made 51.5 pulsations. In the rabbit the time of circulation was 11 seconds, during which there were 31 heart-beats. When solid particles are injected into a moving current, as the blood, the heavier ones are carried at a faster rate than the lighter, because the former are more readily drawn into the swiftly moving axial current. Thus in the living blood-vessels, the heavier red corpuscles are confined to the central core or axial current, while the lighter leucocytes occur chiefly in the outer "inert" layer. The author finds that very finely divided carmine particles suspended in a fluid require twice as long to

pass from one jugular to the other as do the corpuscles of pigeon's blood, and the mean velocity of the current lies somewhere between the two rates determined.—*Am. Jl. Med. Sci., No.* CLXXIV.

PSYCHOLOGY.

THE NATURE OF INSTINCT.—This subject has lately been discussed by Messrs. Romanes and C. Lloyd Morgan. As to the view that there is a science of comparative psychology as held by Romanes and others, Mr. Morgan inquires, in *Nature* for Feb. 14, (1) Whether there is a science of comparative psychology; (2) discusses the place of consciousness; (3) the lapse of consciousness; (4) a psychological definition of instinct; (5) a physiological definition of instinct; (6) the origin and development of instinct. Mr. Morgan thus concludes:

1. While fully admitting the great interest that attaches to the study of the inferred mental faculties of the higher brutes, I believe that, from the ejective nature of the animal mind and the necessary absence of verification, no science of comparative psychology, except such as is restricted to "objective psychology," is possible.

2. Of the four views of the place of consciousness in the animal world, only one—that of *free will*—renders the study of the actions of animals incapable of scientific treatment. Of the other three I believe *determinism* to be the most satisfactory. According to this view both neuroses and psychoses are subject to law. But from our necessarily ejective knowledge of psychoses, we are forced to confine our attention (from the scientific point of view) to the objective phenomena of neurosis, especially as manifested in conduct; of the psychoses, we can know nothing with certainty; of the neuroses we may learn a little; of conduct we may learn much.

3. From the principle of the lapse of consciousness certain corollaries may be drawn: (*a*) That it is difficult or impossible to say what amount of consciousness, if any, an action performed by my neighbor involves; (*b*) that it would seem probable that the lapse of consciousness in the individual is paralleled by a lapse of consciousness in the species; and (*c*) that the hypothesis that instinctive actions are unconscious is incapable of disproof.

4. On the general ground given in 1, and on the special ground given in 3, I see great difficulties in accepting the psychological theory of instinct—that instinct is reflex action into which is imported the element of consciousness.

5. In accordance with the principle thus advocated, a physiological definition of instinct must be sought. Some such definition as this may be proposed: *Instinctive actions* are actions performed by the individual in virtue of his possession of a special